Tutorial
H-1000-5316-02-A

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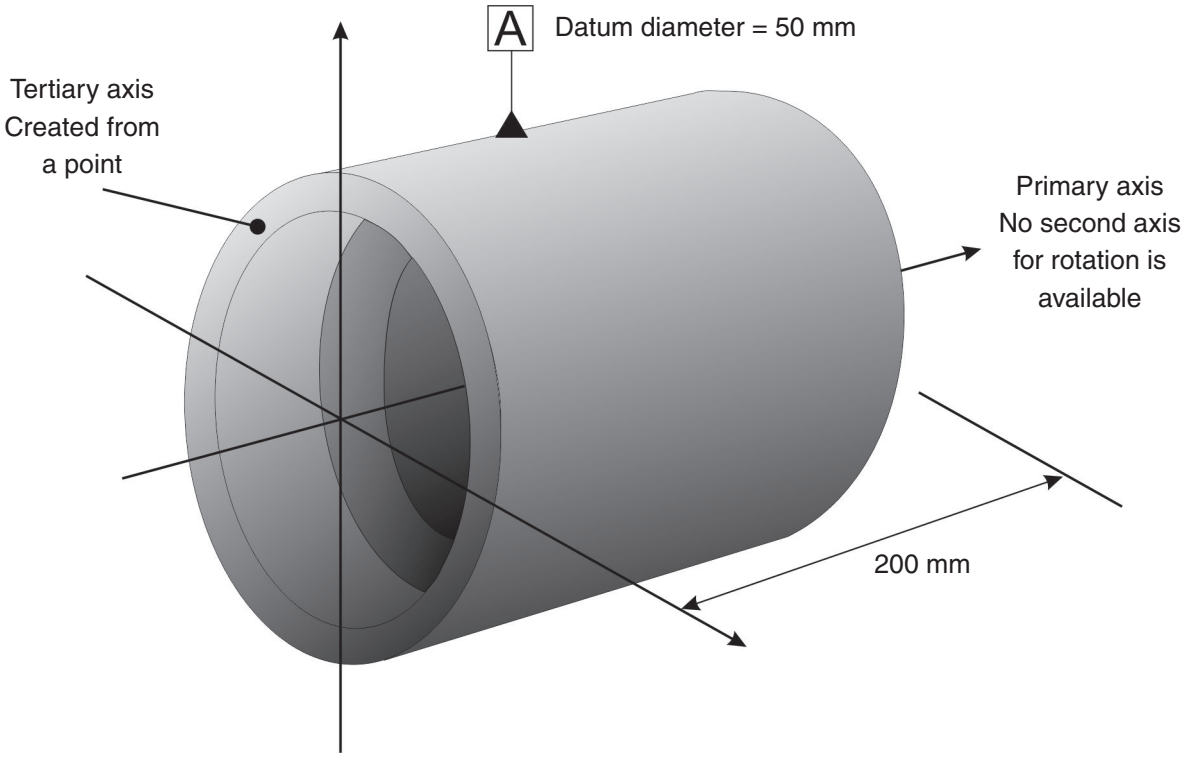
Cylindrical part alignment (non-CAD)



Renishaw part no: H-1000-5316-02-A

Issued: 06 2014

Cylindrical part alignment (non-CAD)

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Contents

1 Cylindrical part alignment (non-CAD)....6

1.1 Tutorial pre-requisites....6

1.2 Tutorial objectives....6

2 Introduction....7

3 Create a manual, basic alignment....8

4 Create an automatic, precise alignment....13

1 Cylindrical part alignment (non-CAD)

1.1 Tutorial pre-requisites

- The student should understand the contents of the ‘Principles of part alignment’ tutorial
- The student should have completed ‘Part alignment - plane, line and point’ tutorials and ‘Part alignment - plane and two circles’ tutorials

1.2 Tutorial objectives

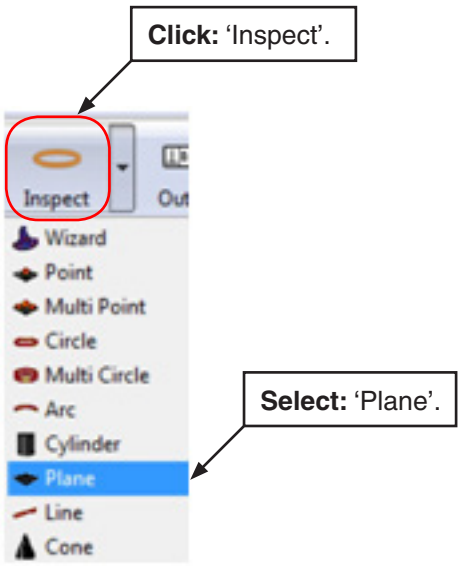
- Further use of alignment techniques relevant to cylindrical items
- Introduction to the manipulation of defined probe paths and measurement points
- Further exposure to programming from drawing definition

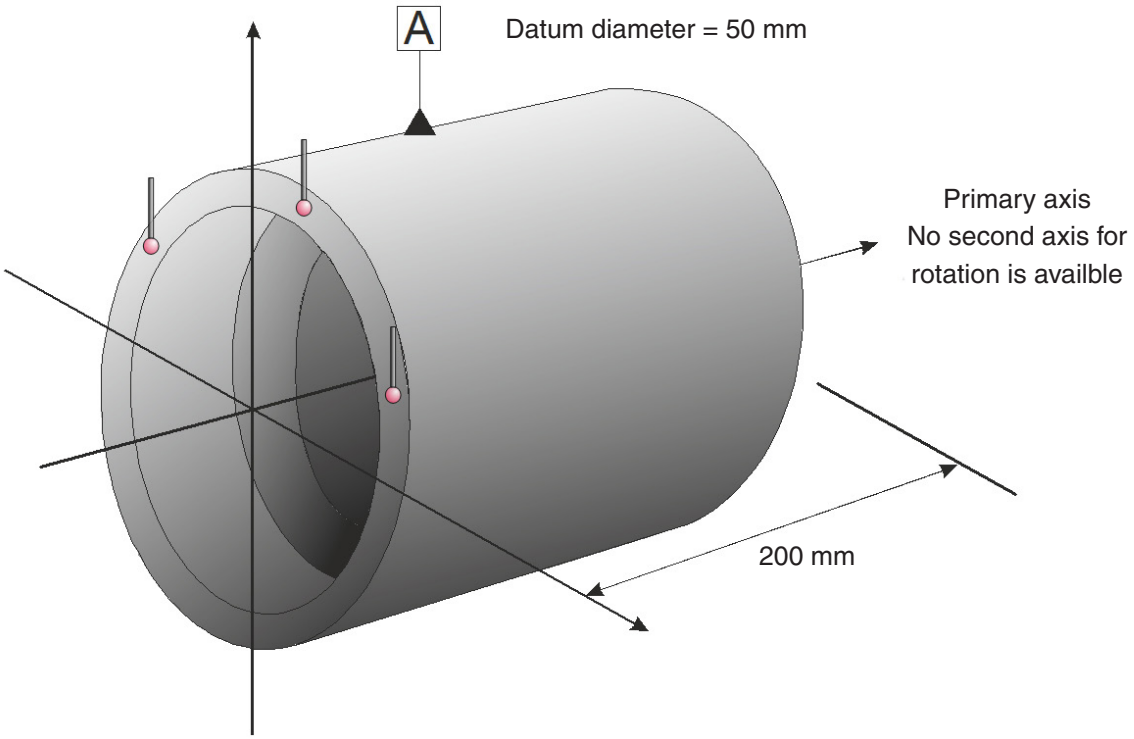
2 Introduction

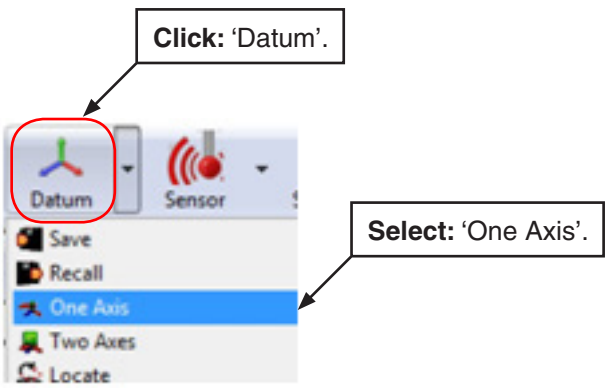
Building on previous tutorials describing basic manual measurement and alignment techniques, this tutorial introduces the student to the concepts of axial alignment of cylindrical components. In addition, the student will learn how to manipulate default measurement paths.

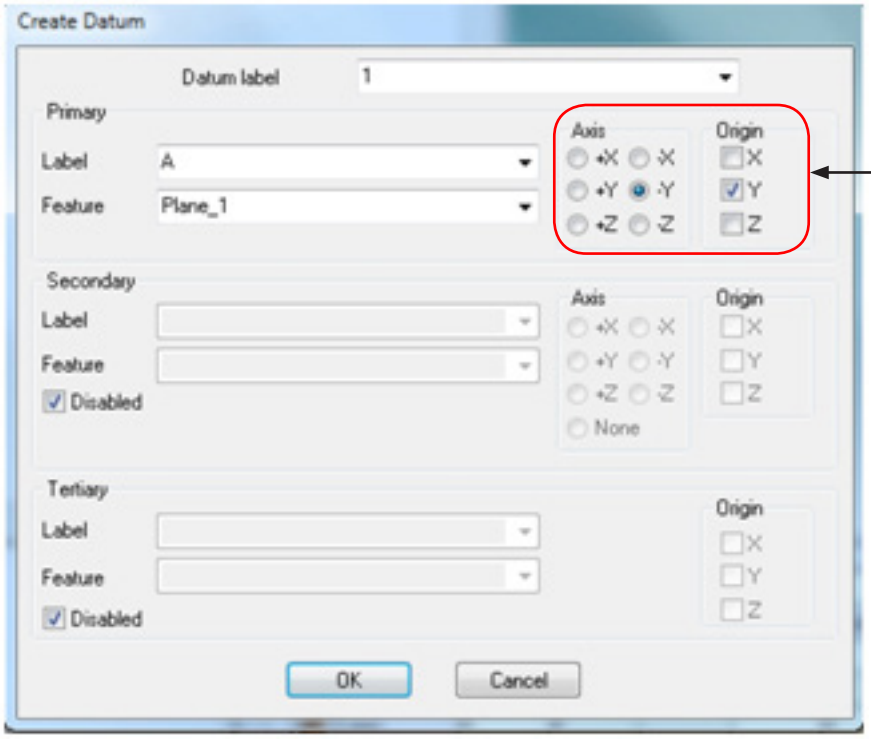
3 Create a manual, basic alignment

Open a new program and load a suitable probe, as described in earlier tutorials.





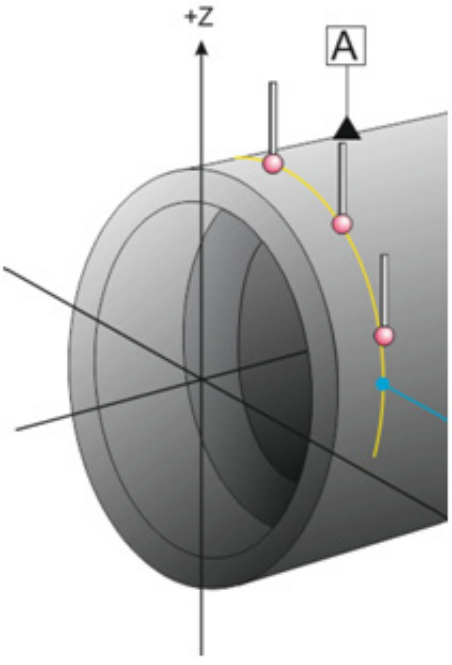


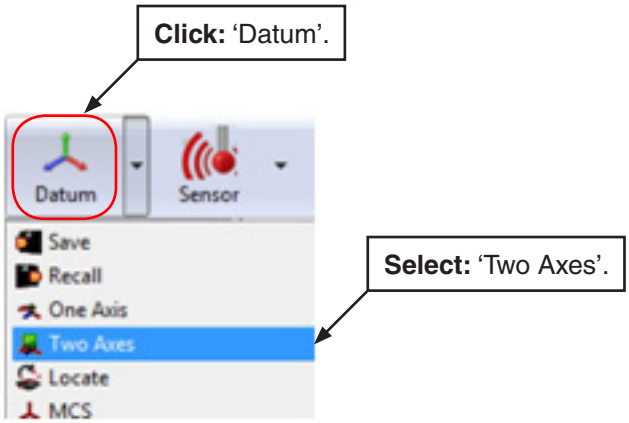


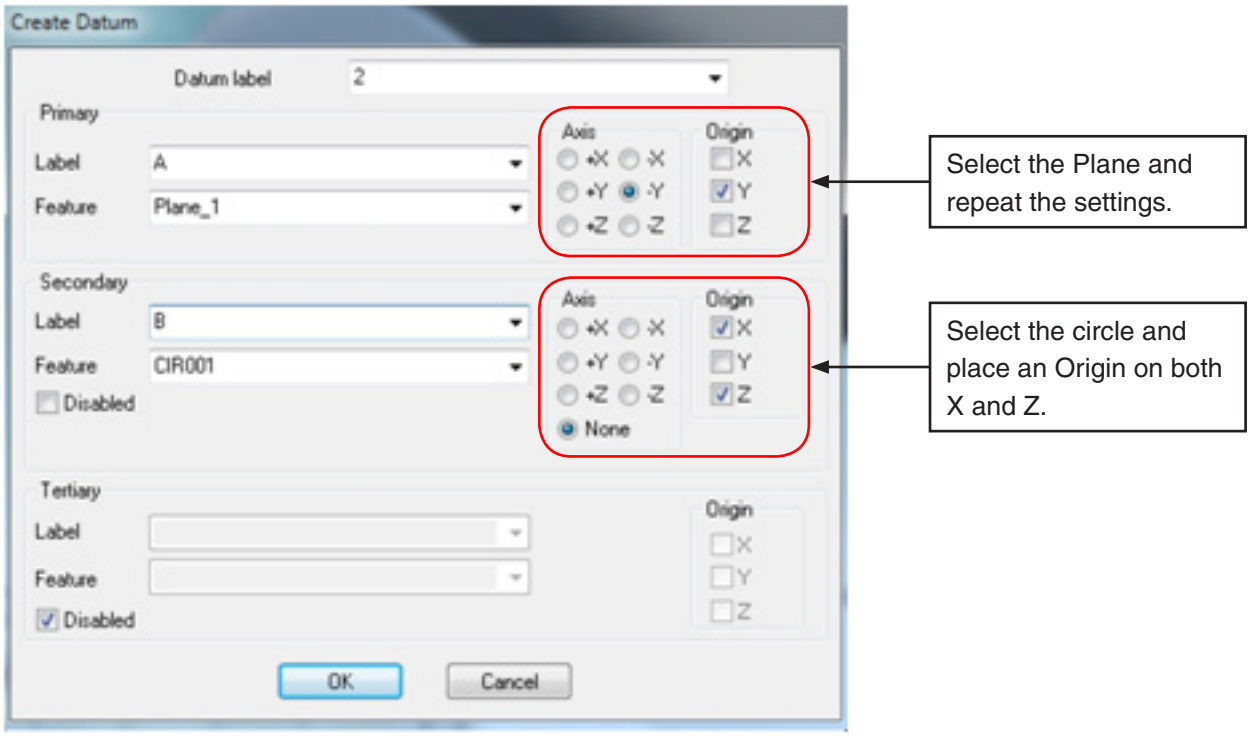
Select: '-Y' for the primary axis and set an origin on the same face.

Click: 'Inspect'.

Select: 'Circle'.





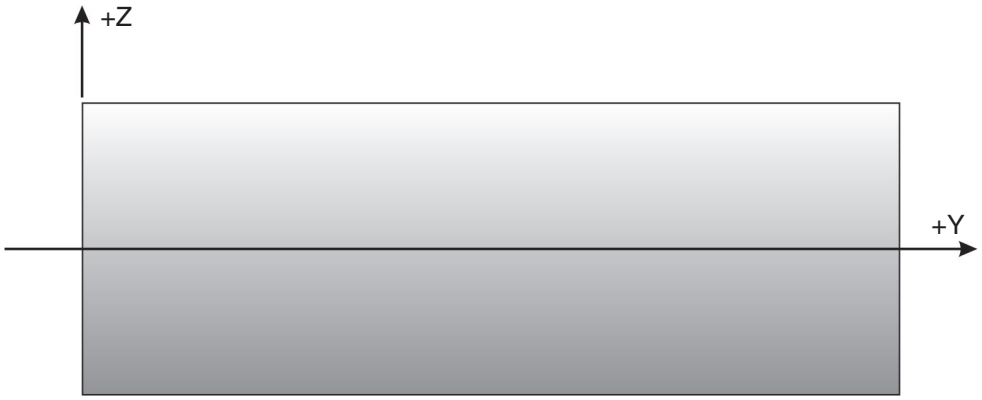


The part alignment is now complete and is ready for measurement.

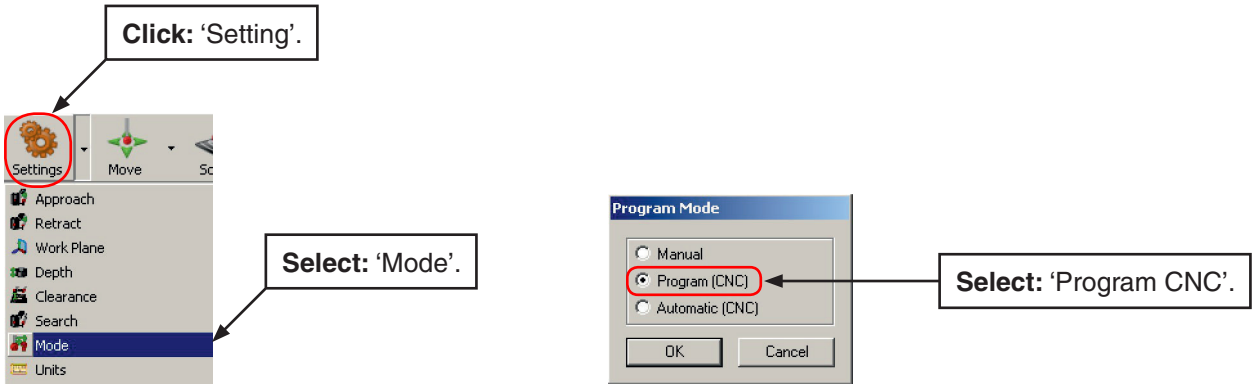
GUIDANCE NOTE: This is a very basic manual alignment using minimum points and is not accurate enough for good metrology.

4 Create an automatic, precise alignment

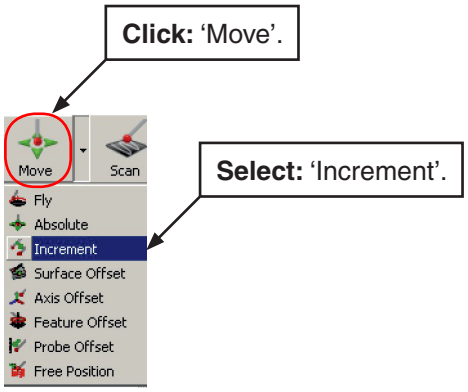
Since the manual alignment uses minimal points, it is not accurate enough for good metrology. An automatic alignment is needed for a more precise alignment.

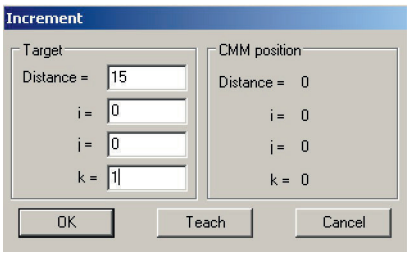


To put the machine in 'Program (CNC)' mode:



Since the machine is now in automatic mode, a GOTO must be added to move the probe clear of the component:





Enter the required values.

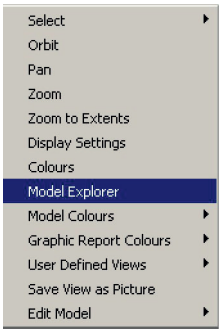
In this case, to move 15 mm up in Z to clear the component. This generates the following code:

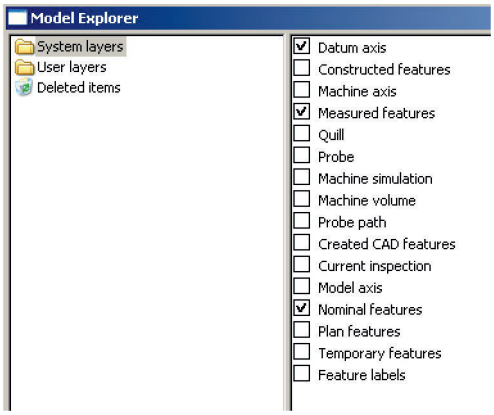
GOTO/INCR,15,0,0,1

The MCU can then be used to move the probe from above the cylinder to a point from which automatic measurements of the circular sections can take place.

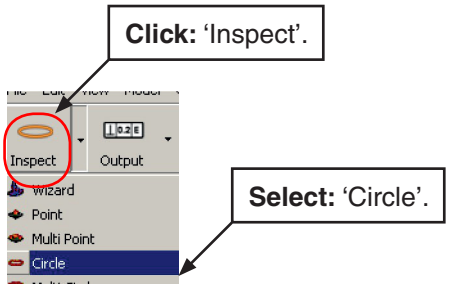
Pressing the 'Take point' button creates a GOTO of this position.

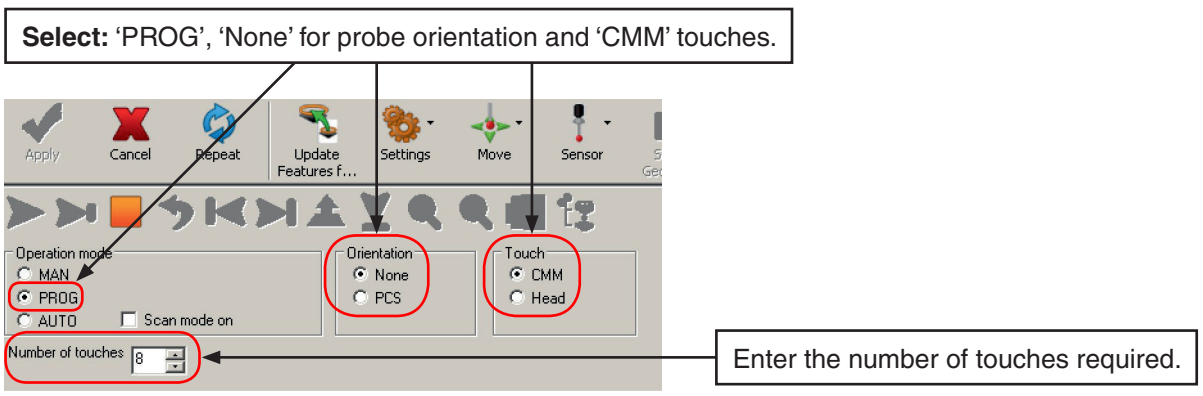
Next, right mouse click in the 'graphics' window, click 'Model Explorer' and select 'Datum', 'Measured features' and 'Nominal features' to display them in the 'graphics' window.



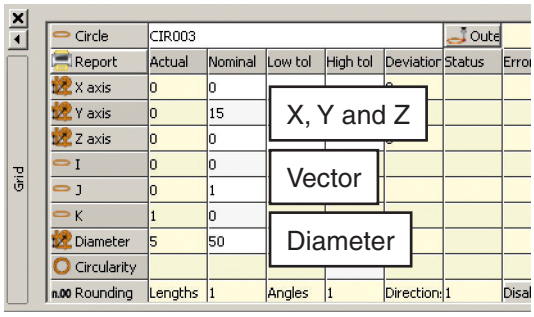


Four circular cross-sections will now be measured along the length of the cylinder.

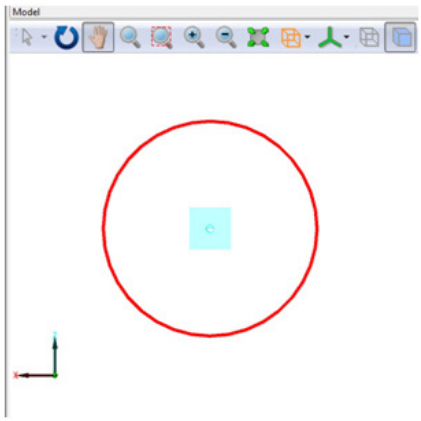




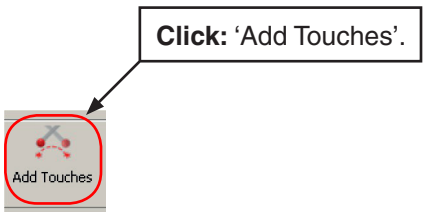
Enter nominal data:



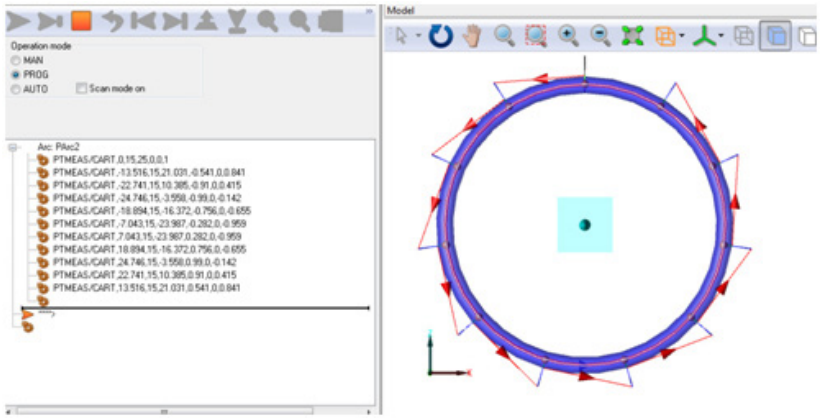
This nominal information allows the correct circle to be placed in the co-ordinate system:



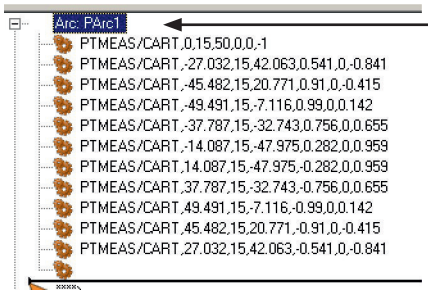
Nominal data



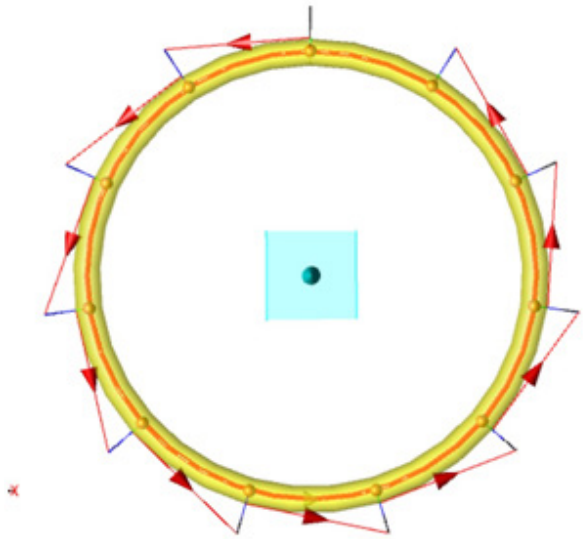
The probe path is shown in the ‘graphics’ window:

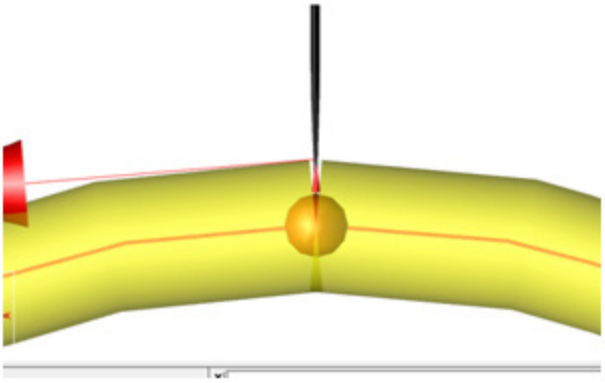


Probe path

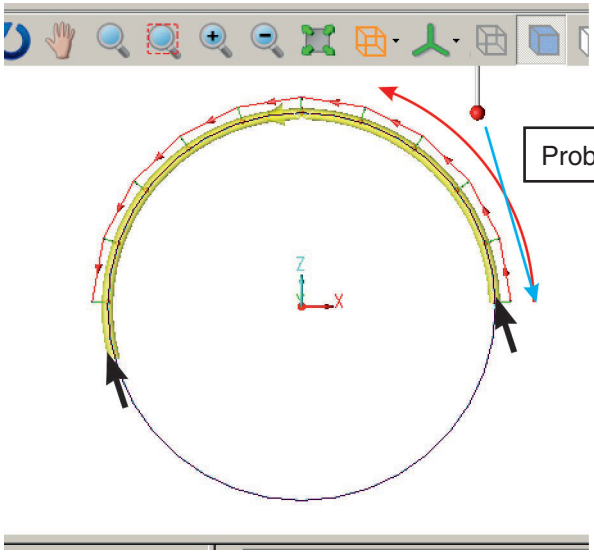


Select the path name. This then changes the path colour showing that the path can be modified.





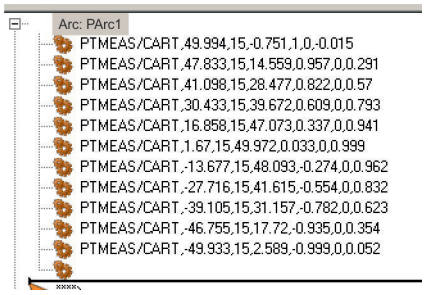
Use the mouse to move the path start and end positions to the desired position that will prevent shanking of the probe:



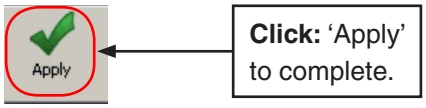
Probe path.

GUIDANCE NOTE: The individual measuring points can be edited and moved if required

It can be seen that the path points have been modified to reflect the new probe path:

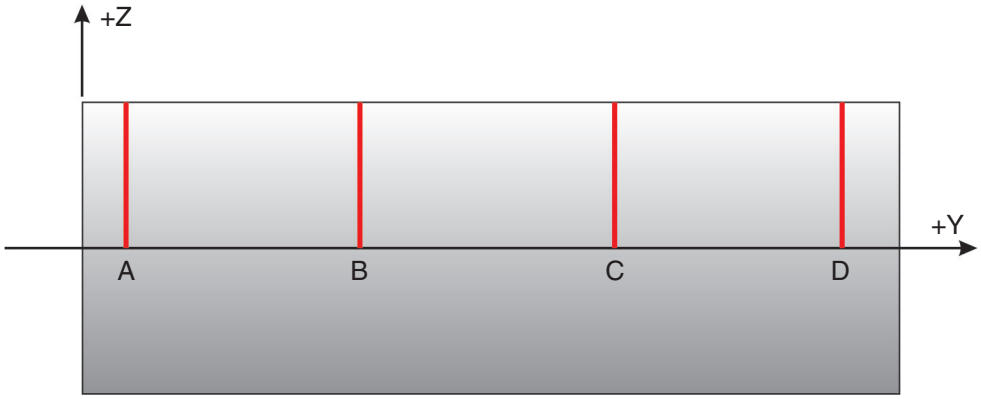


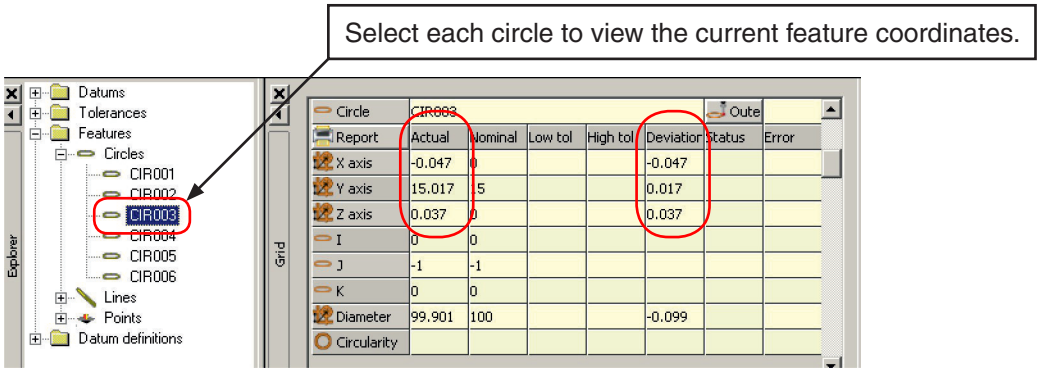
New points



Repeat the above for the other 3 sections. This will now give " CIR002 TO CIR005 ".

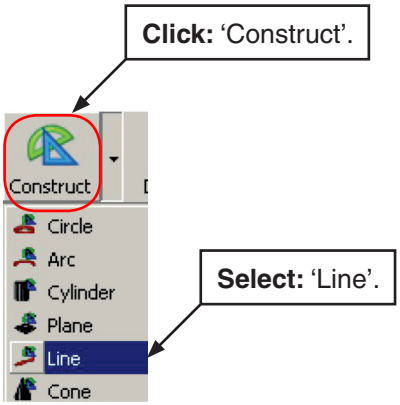
Remember to add GOTO commands to prevent collision when the probe moves from the end of one section to the start of the next.

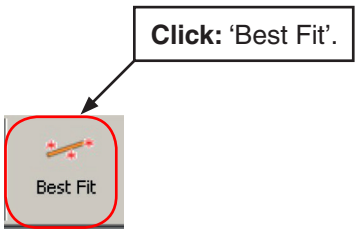




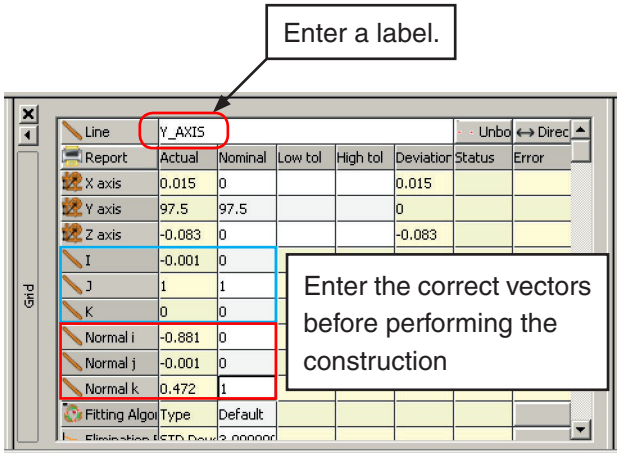
There should be variations in the Z and X values with respect to the provisional alignment.

Now construct another line using the four circles to give a more precise alignment:

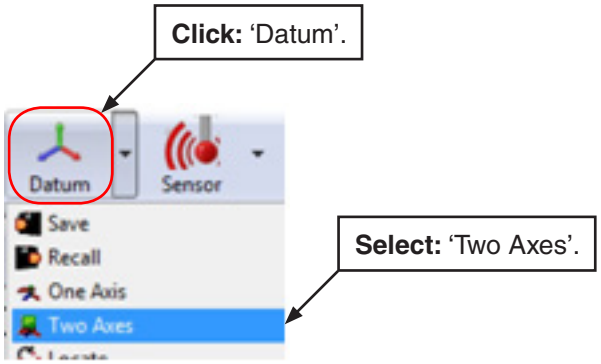


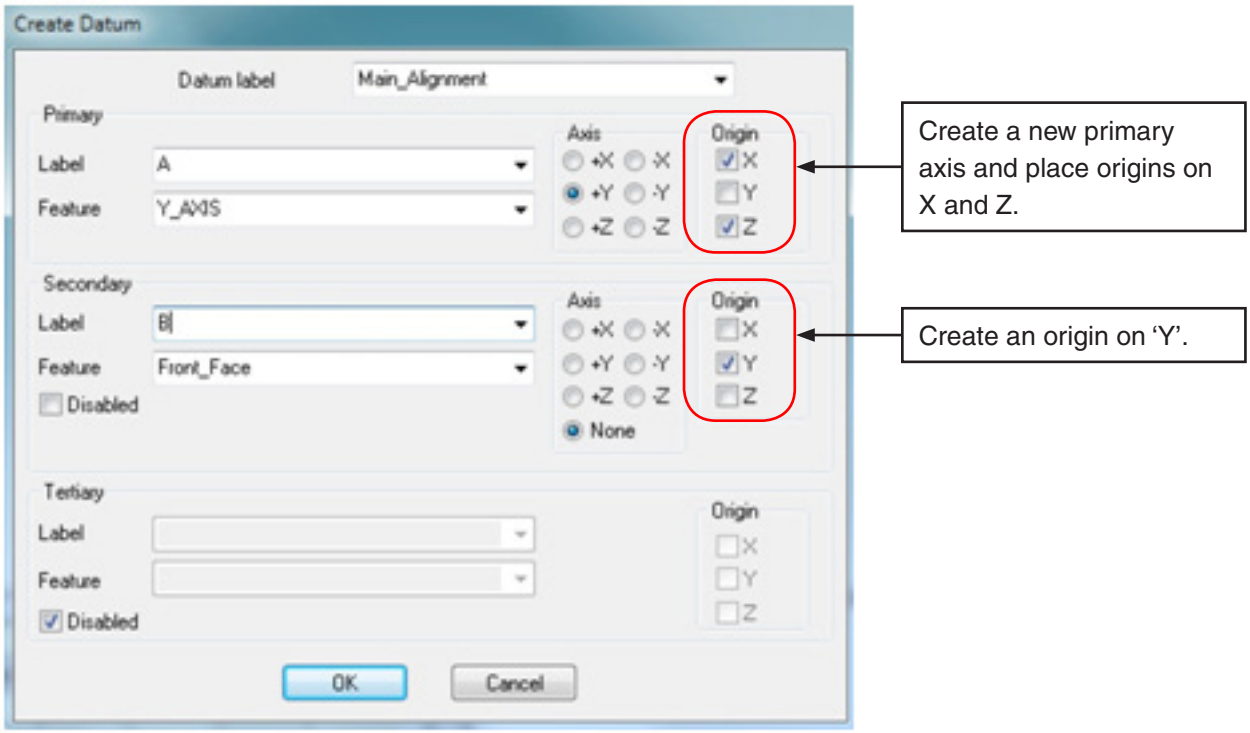


Copy features to the 'construct' window:



This line can now be used to create the main alignment.

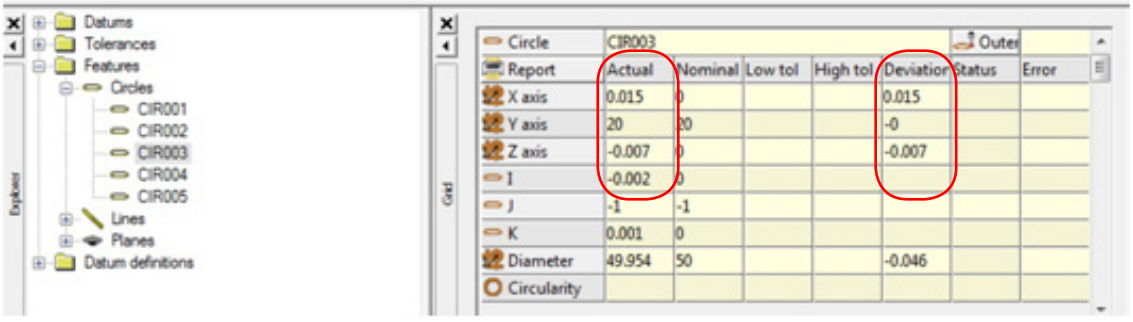




The following code is generated when 'OK' is clicked.

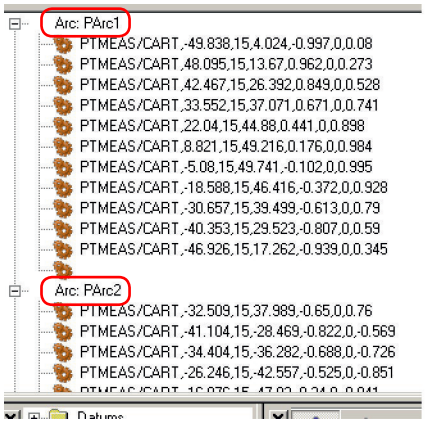
DATDEF/FA(Y_AXIS), DAT(A)
DATDEF/FA(Front_Face), DAT(B)
D(Main_Alignment)=DATSET/DAT(A),YDIR,XORIG,ZORIG,DAT(B),YORIG

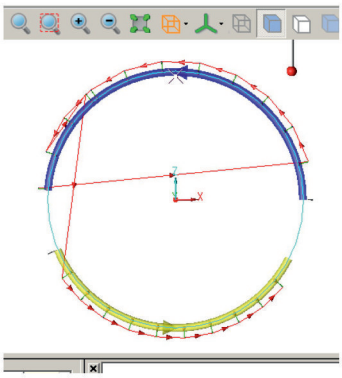
Select each circle to view the current feature in the new coordinate system.

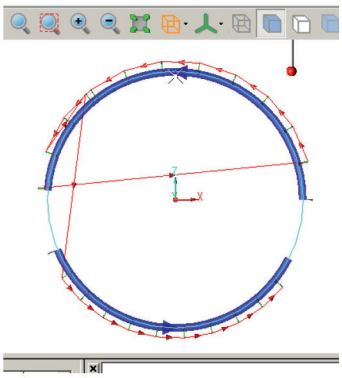


There should be very small variations in the Z and X values with respect to the new alignment.

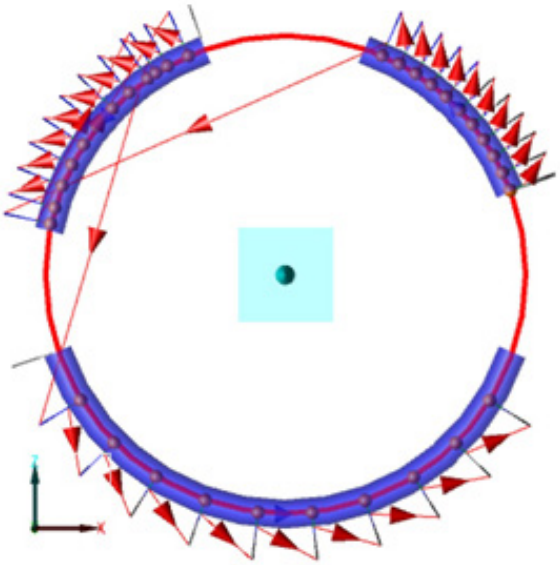
NOTE: More paths can be added within the same feature by selecting ‘Add Touches’. This is useful when having to clear slots and keyways (see below).



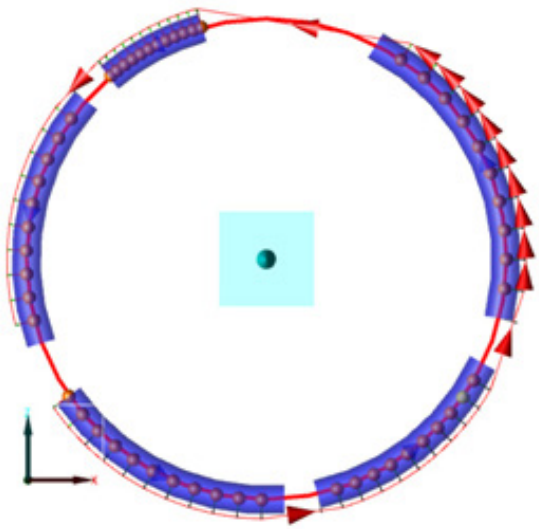




3 sections



5 sections



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Renishaw plc

New Mills, Wotton-under-Edge,
Gloucestershire, GL12 8JR
United Kingdom

T +44 (0)1453 524524
F +44 (0)1453 524901
E uk@renishaw.com

www.renishaw.com

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For worldwide contact details, please visit our main web site at www.renishaw.com/contact

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